

# Groundwater/Vadose Zone

## Goal

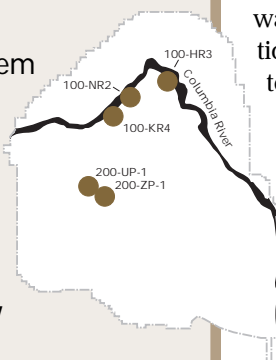
Groundwater remains restricted [from public use and access] for a yet to be determined period, pending decisions on final attainable cleanup levels. Remediation actions will protect the Columbia River and the near-shore environment, reduce contamination entering the groundwater and control the migration of plumes that threaten groundwater quality beyond the boundaries of the Central Plateau.

## Fiscal Year 1998 Objectives

Key objectives for the year were to:

- continue operations at five pump and treat systems
- decommission nonessential Hanford Site wells
- submit project plans for the GW/VZ Integration Project and establish an integrated project team
- establish regular meetings for the GW/VZ Integration Project with contractors, regulators, stakeholders, and Tribal Nations to discuss issues and the need for participation by these groups
- meet Tri-Party Agreement milestones on or ahead of schedule
- restart Vapor Extraction System at 200-ZP-2.

**Pump and Treat Systems are operated at two sites in the 200 Area and in the 100 N, 100 H, and 100 K areas.**



For many years, the Hanford Site's soil and groundwater absorbed effluents from plutonium production activities. In fact, more than 260 square kilometers (100 square miles) of Hanford Site groundwater is contaminated at levels above established drinking water standards. More recently, another contamination source—waste leakage from the site's single-shell tanks—was confirmed in the groundwater, increasing concerns about pollution and reinforcing beliefs that Hanford's groundwater, which moves directly toward the Columbia River, must be a cleanup priority.

RL is working with site contractors to learn more about the characteristics of groundwater at Hanford, and to implement effective cleanup strategies.

In fiscal year 1998, significant progress was made in four areas: reduction of risks to the worker, the public, and the environment; reduction and elimination of the total amount of inventory and materials remaining to be cleaned up; reduction and elimination of costly mortgages (payment for long-term surveillance and maintenance); and application of innovative technology.

### Reduced Risks: Groundwater Project Launched

In January 1998, DOE announced the establishment of the Groundwater/Vadose Zone (GW/VZ) Integration Project, an effort to develop an effective, Hanford-wide strategy to address groundwater and soil contamination. The vadose zone is the geologic area between the land surface and the underlying water table.

Bechtel Hanford, Inc., Hanford's environmental restoration contractor, is managing the project and integrating the participation of other site contractors and Pacific Northwest National Laboratory. Bechtel is also defining the relationships between the GW/VZ project and other site programs and projects, including the Tank Waste Remediation System. Stakeholder and public involvement activities are fully integrated into the GW/VZ project.

The project includes vigorous analysis and research elements that will study a wide range of issues, including the impacts of day-to-day work at Hanford on groundwater and the vadose zone. Such information will be important in establishing near-term and future strategies to address groundwater contamination and to complete cleanup activities.

To date, a project plan has been created and regular meetings with stakeholders—including regulators and Tribal Nations—have been initiated. In addition, an integrated project team has been assembled and a website

(<http://www.BHI-ERC.com/vadose>) has been established to promote public involvement.

Further, a panel of eight nationally recognized technical experts has been formed to play a key role in the project. The panel will meet several times each year and provide DOE with recommendations and advice for reducing groundwater and vadose zone contamination.

The integrated approach to groundwater remediation is expected to have a significant long-term impact on risk reduction at Hanford.

### Reduction of Inventory and Materials: Groundwater Cleaned

Hanford's five pump and treat systems—which pump groundwater from wells, remove contaminants, and pump the water back into the aquifer—processed 1,024,000,000 liters (270,513,000 gallons) of water in fiscal year 1998. The systems provide an important line of defense, helping intercept and contain plumes of contaminated groundwater before the water reaches the Columbia River. During the year, the pump and treat systems, located in the 100 and 200 areas, recovered contaminants such as strontium 90, carbon tetrachloride, and chromium.

Meanwhile, a vapor extraction system in the 200 Area was restarted in March 1998 after a six-month shutdown for upgrades. The system removed 1,993.9 kilograms (4,396 pounds) of carbon tetrachloride.



**A groundwater extraction well for the 100-DR-4 pump and treat system is installed. Five pump and treat systems were in operation during fiscal year 1998.**

Also in fiscal year 1998, groundwater personnel assisted with the disposal of "investigation derived wastes" created during Hanford Site characterization activities in the early 1990s. The 1,800 drums of material were delivered to the Environmental Restoration Disposal Facility.

### Reduction and Elimination of Costly Mortgages: Wells Decommissioned

The decommissioning of 28 nonessential groundwater monitoring wells will produce cost savings. Periodic inspections once required at the wells no longer are necessary.

In addition, in Hanford's 200 West Area, a demonstration pump and treat system built to test if uranium and technetium concentrations in groundwater could be removed, was decommissioned after testing was completed successfully. The

system was dismantled and parts were sold to a local company as part of DOE's economic diversification and development program.

### Innovative Technology Applications: New Sampling Methods

The MicroChemical Chromium Monitor, which provides a greater number of samples and less secondary waste than manual discrete sampling and analysis methods, was deployed at the 100 HR pump and treat system in March 1998. The monitor measures chromium in the influent and effluent of the treatment system, and provides near real-time response. It is estimated the device will reduce secondary waste generated by sampling by more than 90 percent, providing return on investment within five years.

Another new sampling technology detected small amounts of plutonium in a monitoring well near the K Basins. Although the amount is about 10,000 times below established drinking water standards, the information will be useful to ongoing groundwater contamination characterization activities on the Hanford Site. The sampling began in October 1997 and was part of a science research project performed by Woods Hole Oceanographic Institution in cooperation with Pacific Northwest National Laboratory.

Also in fiscal year 1998, the Aquifer Sampling Tube System was installed along a 45-kilometer (28-mile) stretch of the Columbia River's Hanford Reach. The 220 sampling tubes supply detailed data about the types of contaminants entering the Columbia River. The information will help guide cleanup decisions.



**Workers maintain a well in the 200 Area.**

## Accomplishments

- Pump and treat systems processed 1,024,000,000 liters (270,513,000 gallons) of contaminated groundwater; all systems operated at or above planned availability.
- 28 nonessential monitoring wells were decommissioned.
- A plan for the GW/VZ project was completed on schedule in February 1998, an expert panel was established, and an integrated project team was created. Also, a project web site (<http://www.BHI-ERC.com/vadose>) was established, public workshops were held, and weekly project meetings, open to the public, were initiated.
- After a shutdown for upgrades, the Vapor Extraction System at 200-ZP-2 was restarted March 30, 1998.
- A demonstration pump and treat system in the 200 West Area was dismantled, with excess equipment sold to a local company as part of a DOE economic diversification program.
- Tri-Party Agreement milestones were met on or ahead of schedule.

## Near-Term Challenge

Establishing the GW/VZ project on a firm foundation is essential. This will require continued advancement of the GW/VZ project planning and development activities and identification of funding sources to support the work scope of the project.